

Table of Contents
Environmental Document
Giant and Bull Kelp
Commercial and Sportfishing Regulations

	Page
List of Tables	v
List of Figures	vi
List of Appendices	vi
Conversion Table	vii
Summary of Proposed Project	1-1
Proposed Project	1-1
Effects on the Environmental	1-2
Public Input	1-3
Areas of Controversy	1-4
Issues to be Resolved	1-5
Conclusion	1-6
Chapter 2. Project Description	2-1
2.1 Proposed Project	2-1
2.2 Project Objectives	2-3
2.3 Functional Equivalent	2-4
2.4 Scope and Intended Use of Environmental Document	2-4
2.5 Management Techniques	2-10
2.5.1 Regulatory	2-10
2.5.1.1 Closures	2-10
2.5.1.1.1 Temporary Closures	2-10
2.5.1.1.2 Permanent Closures	2-11
2.5.1.2 Method of Take	2-11
2.5.1.3 Harvest Limits	2-12
2.5.1.3.1 Commercial Harvest	2-12
2.5.1.3.2 Sport Harvest	2-12

2.5.2 Nonregulatory	2-13
2.6 Authorities and Responsibilities	2-13
2.7 Location and General Characteristics of the Project Area	2-16
Chapter 3. Environmental Settings	3-1
3.1 General Description of the Marine Environment	3-1
3.1.1 Weather Oceanography and Geology	3-1
3.1.2 Habitat Types	3-4
3.2 Life History	3-4
3.2.1 Taxonomy and Morphology	3-4
3.2.2 Distribution	3-7
3.2.3 Life Cycle	3-8
3.2.3.1 Reproduction and Development	3-8
3.2.3.2 Dispersal and Recruitment	3-13
3.2.4 Age and Growth	3-16
3.2.5 Nutrient Uptake	3-21
3.2.6 Productivity	3-23
3.2.7 Natural Mortality	3-24
3.2.7.1 Abiotic Factors	3-24
3.2.7.2 Parasites and Disease	3-27
3.2.7.3 Mortality Caused by Animals and Plants	3-28
3.2.8 Competition	3-32
3.2.9 Kelp Community	3-34
3.2.9.1 Invertebrates	3-34
3.2.9.2 Fish	3-38
3.2.9.3 Birds	3-41
3.2.9.4 Mammals.....	3-42
3.2.9.5 Representative Communities.....	3-44
3.2.9.6 Drift Kelp and Kelp Wrack	3-47

3.2.10 Importance of Habitat Loss, Degradation, and Modification	3-48
3.2.10.1 Coastal Development	3-48
3.2.10.2 Waste Disposal	3-49
3.2.11 Kelp Restoration	3-53
3.2.12 Importance of El Niño Events	3-57
3.3 Status of the Kelp Population in California	3-59
3.3.1 North Coast	3-65
3.3.2 Central Coast	3-66
3.3.3 Southern Coast	3-69
3.4 Socioeconomic Environment	3-70
3.4.1 Commercial Kelp Harvesting Industry	3-71
3.4.2 Commercial Fisheries Harvest	3-78
3.4.3 Sport Harvest of Kelp	3-87
3.4.4 Recreational Utilization of Kelp Beds	3-87
3.5 Regulatory/Management Environment	3-89
3.5.1 Responsible Agency	3-89
3.5.2 Management Concepts and Tools	3-89
3.5.3 Resource Assessment Methods	3-89
3.5.3.1 Monitoring Programs	3-89
3.5.3.2 Harvest and Landing Records	3-90
3.5.3.3 Surveys	3-90
Chapter 4. Environmental Impacts	4-1
4.1 Effect of Kelp Harvest on Finfish Population	4-1
4.2 Effect of Kelp Harvest on Invertebrate Populations	4-5
4.3 Effect of Kelp Harvest on Bird Populations	4-7
4.4 Effect of Kelp Harvest on Marine Mammal Populations	4-8
4.5 Effect of Kelp Harvest on Biological Communities That Use Drift Kelp	4-10
4.5.1 Effect of Kelp Harvest on Beach Wrack Communities	4-11

4.6 Land Use	4-12
4.7 Scenic, Recreation and Noise Impacts	4-12
4.8 Air Quality and Fuel Use	4-14
4.9 Cumulative Effects	4-17
4.9.1 Effects of Kelp Harvest on Giant and Bull Kelp	4-17
4.9.2 Effect of Commercial Fishing on Kelp Resources	4-23
4.9.3 Effect of Sportfishing on Kelp Resources	4-24
4.9.4 Effect of Waste Disposal on Kelp Resources	4-24
4.9.5 Effect of Coastal Development on Kelp Resources	4-25
4.9.6 Water Quality	4-25
4.9.7 Unusual Weather Events	4-26
Chapter 5. Mitigation	5-1
Chapter 6. Alternatives	6-1
6.1 Alternative 1 (Statewide Harvest Controls).....	6-2
6.2 No Action	6-3
Chapter 7. Consultation	
Chapter 8. Responses to Comments Regarding The Proposed Project	
8.1 List of Comments Received	
8.2 Department Response to Comments	
8.3 Copy of Letters Received	
Literature Cited	L-1
Personal Communication	

List of Tables

	Page
Table 1-1. Summary of significant impacts expected by the proposed project and the alternatives	1-3
Table 3-1 <i>Macrocystis</i> restoration techniques used in California	3-55
Table 3-2 Levels of <i>Nereocystis</i> populations in northern California. Area measured in square statute miles	3-65
Table 3-3 California coastal kelp resources kelp canopy area survey (Square statute miles)	3-69
Table 3-4 Total annual <i>Nereocystis</i> harvest, number of months harvesting occurred, average weight harvested per trip, and annual effort in Crescent City	3-79
Table 3-5 Total pounds landed of several species harvested from kelp beds from 1989 to 1993	3-80
Table 3-6 Number of herring roe-on-kelp permits, tons of kelp harvested for the open pound method, tons of roe-on-kelp harvested, and quota allocation by season.	3-81
Table 3-7 Quotas, landings and numbers of permits for the herring eggs-on-kelp fishery in the San Francisco Bay, 1989-1990 season through 1999-2000 season	3-86
Table 3-8 Numbers of herring eggs-on-kelp permist, tons of kelp harvested for the open pound method, tons of eggs-on-kelp harvested, and quota allocation by season in San Francisco Bay	3-87
Table 4-1. Representative uncontrolled operation noise	4-14
Table 4-2. Daily emission rates from Kelco harvesting vessels (tons/day) in comparison with statewide fishing vessel emission rates and statewide emission rates from all sources.	4-15
Table 4-3. Daily emission rates from Abalone Farms, Inc. harvesting vessels (tons/day) in comparison with statewide fishing vessel emission rates and statewide emission rates from all sources.	4-16
Table 4-4. Daily emission rates from Abalone International, Inc. harvesting vessel (tons/day) in comparison with statewide fishing vessel emission rates and statewide emission rates from all sources	4-16

List of Figures

	Page
Figure 2-1a Administrative kelp beds, Mexico to Morro Bay	2-5
Figure 2-1b Administrative kelp beds, Santa Barbara to Bodega Bay.....	2-6
Figure 2-1c Administrative kelp beds, Bodega Bay to Oregon	2-7
Figure 2-2 Proposed area/time closure in the Monterey Bay National Marine Sanctuary	2-8
Figure 2-3 Proposed closure area in administrative bed 220	2-9
Figure 3-1 Giant kelp morphology	3-5
Figure 3-2 Bull kelp morphology	3-6
Figure 3-3 Giant kelp life cycle (source-Foster and Schiel, 1985)	3-9
Figure 3-4 Bull kelp life cycle (source-Tera corporation, 1982)	3-12
Figure 3-5 Regional Divisions of California	3-60
Figure 3-6a Ten year kelp bed usage for beds from the California-Mexico border to Morro Bay	3-62
Figure 3-6b Ten year kelp bed usage for beds from Morro Bay to San Francisco Bay	3-63
Figure 3-6c Ten year kelp bed usage for beds from San Francisco Bay to the California-Oregon border	3-64
Figure 3-7 Changes in bull kelp canopy in kelp bed no. 205 from 1969 to 1977. (source-Simpson, 1979)	3-68
Figure 3-8 Fluxuation in harvest tons for beds 2, 3, and 4	3-72
Figure 3-9 Fluxuation in harvest tons for beds 30, 31, and 32	3-73
Figure 3-10 Comparison of high yield beds during the 1998 El Niño	3-74
Figure 3-11 High use kelp beds, 1989-1999	3-75
Figure 3-12 Coastwide kelp harvest, 1989-1999	3-75
Figure 3-13 Changes in total ex-vessel revenue in the live finfish fishery, 1989-1999	3-81
Figure 3-14 Illustration of typical open pound	3-85
Figure 3-15 Portion of a kelp plant used on a pound	3-85
Figure 6-1 Map of Monterey Bay National Marine Sanctuary recommended regulations for bed 220	6-2

List of Appendices

Appendix 1	Fish and Game Code and Title 14	A-1
Appendix 2	Proposed Regulatory Changes Sections 165 and 165.5, Title 14, CCR	A-2
Appendix 3	Commercial Kelp Landings 1916-1999	A-3

CONVERSION TABLE

Metric to U.S. Customary

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
kilometers (km)	0.6214	miles
square meters (m^2)	10.76	square feet
square kilometers (km^2)	0.3861	square miles
hectares (ha)	2.471	acres
liters (l)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (g)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (t)	2205.0	pounds
metric tons	1.102	short tons
kilocalories (kcal)	3.968	BTU
Celsius degrees	1.8($^{\circ}\text{C}$) + 32	Fahrenheit degrees

U.S. Customary to Metric

inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
acres	0.4047	hectares
square miles (mi^2)	2.590	square kilometer
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
short tons (ton)	0.9072	metric tons
British thermal units (BTU)	0.2520	kilocalories
Fahrenheit degrees	0.5556($^{\circ}\text{F}$ - 32)	Celsius degrees